

CLAIMS

What is claimed is:

1. A two-stage shock absorber comprising:

a pressure tube defining a chamber;

a piston member slidably disposed within said pressure tube, said piston member dividing said chamber and a lower working chamber;

a piston rod extending through said upper working chamber and projecting out of said pressure tube, said piston rod being attached to said piston member;

a first valve assembly attached to said piston member, said first valve assembly permitting fluid flow from said upper working chamber to said lower working chamber through a first passage defined by said piston member, said first valve assembly restricting fluid flow from said lower working chamber to upper said working chamber;

a second valve assembly attached to said piston member, said second valve assembly permitting fluid flow from said lower working chamber to said upper working chamber through a second passage defined by said piston member, said second valve assembly restricting fluid flow from said upper working chamber to said lower working chamber;

a housing attached to said piston rod, said housing defining a pressure chamber;

a piston slidably disposed within said pressure chamber, said piston defining an upper fluid chamber within said housing;

a first bleed valve assembly disposed between said pressure chamber and said upper fluid chamber, said first bleed valve assembly controlling fluid flow between said pressure chamber and said upper fluid chamber; and

a third fluid passage defined through said piston rod, said third fluid passage extending between said upper working chamber and said pressure chamber.

2. The two stage shock absorber according to Claim 1 wherein said piston defines a lower fluid chamber within said housing.

3. The two stage shock absorber according to Claim 2 wherein said shock absorber further comprises a second bleed valve assembly disposed between said lower fluid chamber and said lower working chamber for controlling fluid flow between said lower fluid chamber and said lower working chamber.

4. The two stage shock absorber according to Claim 3 wherein said shock absorber further comprises a third bleed valve assembly disposed between said lower fluid chamber and said lower working chamber for controlling fluid flow between said lower fluid chamber and said lower working chamber.

5. The two stage shock absorber according to Claim 3 wherein said shock absorber further comprises a third bleed valve assembly disposed between said upper fluid chamber and said pressure chamber for controlling fluid flow between said pressure chamber and said upper fluid chamber.

6. The two stage shock absorber according to Claim 5 wherein said shock absorber further comprises a fourth bleed valve assembly disposed between said lower fluid chamber and said lower working chamber for controlling fluid flow between said lower fluid chamber and said lower working chamber.

7. The two stage shock absorber according to claim 6 wherein said first bleed valve assembly comprises a first needle extending through a first restriction, said second bleed valve assembly comprises a second needle extending through a second restriction, said third bleed valve assembly comprises a first valve plate and a first biasing member biasing said first valve plate against said housing, said first valve plate defining said first restriction, and said further bleed valve assembly comprises a second valve phase and a second biasing member biasing said second valve plate against said housing, said second valve plate defining said second restriction.

8. The two stage shock absorber according to Claim 7 wherein said first and second needles are attached to said piston.

9. The two stage shock absorber according to claim 3 wherein said first bleed valve assembly comprises a first needle extending through a first restriction and said second bleed valve assembly comprises a second needle extending through a second restriction.

10. The two stage shock absorber according to Claim 7 wherein said first and second needles are attached to said piston.

11. The two stage shock absorber according to Claim 1 wherein said housing is threadingly received on said piston rod.

12. The two stage shock absorber according to Claim 1 wherein said shock absorber further comprises a second bleed valve assembly disposed between said upper fluid chamber and said pressure chamber for controlling fluid flow between said pressure chamber and said upper fluid chamber.

13. The two stage shock absorber according to Claim 1 wherein said first bleed valve assembly comprises a first needle extending through a first restriction.

14. The two stage shock absorber according to Claim 12 dependent on 13, said second bleed valve assembly comprising a valve plate and a biasing member biasing said valve plate against said housing said valve plate defining said first restriction.